

WHITE PAPER

Waveform Generators Increase Design Efficiency

Introduction

Arbitrary waveform design and use have had limited flexibility until recently. To change a waveform, you had to generate a new signal. While you might have been able to change one or two points by hand, changing large parts of the waveform required a redesign. Keysight Trueform Series waveform generators make arb signal generation more flexible and workflow easier.

This white paper discusses how **Trueform Series waveform generators** can help your arb waveforms do more and overcome some test challenges.



The waveform sequencing and frequency lists are unique to Trueform Series waveform generators. These capabilities make arb signal generation more flexible and workflow more efficient.

How to Overcome Test Challenges Using Arb Waveforms

Here are four things you can do with Trueform Series waveform generators:

1. Change one segment of an arb without redesigning the whole signal

You designed your custom arb signal, and it worked exactly as desired during the device-under-test (DUT) phase. Using the signal, you found defects in your DUT that you did not expect. Now you would like to reuse the signal with glitches added to ensure that the DUT can handle the transient. Trueform waveform generators with the arb sequencing feature give you the flexibility to add in signal characteristics without having to redesign the whole waveform.

2. Play a signal continuously until an event starts another signal

When sending signals to your DUT, you need to send a different signal when an event occurs. You have to send commands to the generator when you want a new signal. In the past, achieving the desired signal with your function generator was difficult. Trueform Series waveform generators with the waveform sequencing capability enable advanced triggering to allow you to generate different signals and multiple signals.

3. Reuse your proven signal designs but put them together in a different order

You have designed arbitrary waveform signals for a while, and now you would like to shuffle their order to test different characteristics. Trueform Series waveform generators allow you to build a library of arbs and combine them into sequences to create new waveforms. You can then quickly resequence the arbs in any order. With the ample waveform memory available on the Trueform Series waveform generators, you can store numerous arb signals on your instrument so that you can change your arbs faster.

4. Make your arb sweep through a set of different frequencies

You designed your signal using a PC and uploaded it to a signal generator. However, you want the signal to have different sample rates or frequencies. In the past, you would have had to manually change the frequency each time you performed a different test. Trueform Series waveform generators allow you to perform this task using frequency lists. You can set a list of frequencies and the dwell time right in the instrument.

Design Arbitrary Waveforms More Efficiently

As an engineer, you would like to reuse as much of your work as possible, whether it's programming or a circuit design. With Trueform Series waveform generators, you can reuse, re-sort, and change parameters on your arbs to build a whole new signal. This approach not only saves you time, but it also increases your confidence in the new signal because you are reusing proven waveforms.

Waveform sequencing

For those engineers looking to create a more efficient workflow to generate arbitrary signals, waveform sequencing may be just the answer you need to streamline your development. Using waveform sequencing, you can develop a library of arbitrary waveform signals, then reorganize the signals into a sequence to create a new signal. A sequence is simply an ordered list of arbitrary waveforms that run sequentially at a specified sample rate. In the Trueform Series waveform generators, you can store arbitrary

signals as .arb, .csv, or .dat files. The waveform generators store the sequence as a .seq file. A sequence can have up to 512 steps. A total of 32 sequences with up to 1,024 segments can be preloaded into the generator’s volatile memory to improve throughput.

The Keysight 33600A Series and 33500B Series Trueform waveform generators can store up to 64 million sample waveforms. With waveform sequencing, you can save memory by replaying shorter waveforms at different locations in your signal as needed.

Figure 1 is an example that uses Keysight PathWave BenchVue Waveform Builder Pro to build a new signal from a library of arbs.



Figure 1. A table listing each waveform in sequence

As Figure 1 shows, this sequence will play “MyArb1” until it receives a trigger. It will then play “MyArb4” 200 times, and it will finish by playing “MyArb2” indefinitely. The sync signal will stay at the same level throughout the sequence.

For more complex sequences, you can use PathWave BenchVue Waveform Builder Pro software (a program you can purchase to run on your PC) to construct a sequence.

Frequency lists

Most generators have a way to sweep through a range of frequencies. They enable you to output your signals at different frequencies, linearly or logarithmically. Trueform Series waveform generators allow you to define a frequency list and set the dwell frequency. You can create a list of up to 128 frequencies and set your dwell time. The generator goes through the list of frequencies sequentially, staying at each frequency for the defined dwell time.

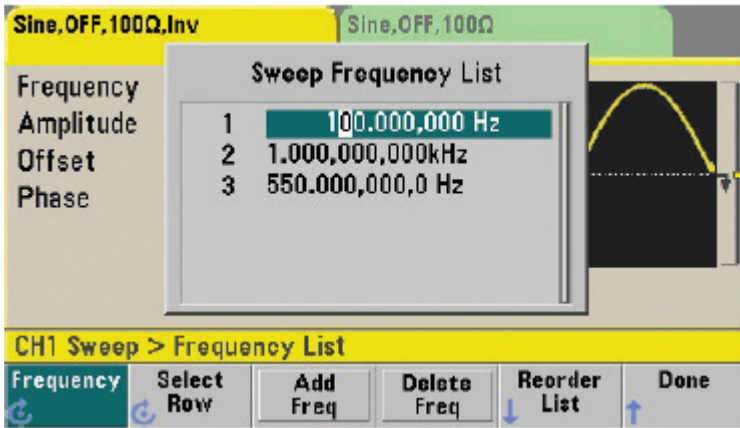


Figure 2. Trueform waveform generator frequency list menu

Summary

The Trueform Series waveform generators build on the features of their predecessor. The waveform sequencing and frequency lists are two capabilities unique to the Trueform Series that help create a more efficient workflow to generate arbitrary signals.

With PathWave BenchVue Waveform Builder Pro, you get advanced signal-creation and editing capabilities without spending hours programming. The software supports the following Keysight products:

- 33500B Series Trueform waveform generators, 20 and 30 MHz
- 33600A Series Trueform waveform generators, 80 and 120 MHz